A BILL to carry out the recommendations of the Universities Commission, those recommendations having been accepted by the Government of India after consultation with the local administrations, was introduced by the Hon. Mr. Raleigh on November 4 to the Supreme Legislative Council of India. We learn from the *Times* that the Bill reduces the number of ordinary fellows to 100 in the case of the senior universities, and to 75 in the cases of the Allahabad and Punjab Universities. The "syndicate" is also to be reduced in membership, so as to make it a compact working body, to be recognised as the executive authority of the university entrusted with certain powers independently of the Senate. The existing members of the Senate will be continued merely as honorary fellows, and be divested of any share in the active business of the university, excepting the right to vote for legislative or municipal representatives. The privilege of electing fellows will be maintained in cases where it exists. It will be for the Government to decide as to the extension or withdrawal of the affiliation of colleges, the function of the university in this respect being merely advisory. Sir Denzil Ibbetson announced that, with the approval of the Secretary of State, it had been decided to make for five years special grants-in-aid to universities and colleges the claims of which to special assistance in carrying out the contemplated reforms are established.

DR. FREDERIC ROSE, His Majesty's Consul at Stuttgart, has made another report to the Foreign Office on technical instruction in Germany. This report is published as No. 600 in the miscellaneous series of diplomatic and consular reports, and is concerned with the building and engineering trades' schools, the aims, organisation and equipment of the Baugewerkschulen being described. Dr. Rose gives very instructive accounts of the schools of this kind in Stuttgart, Karlsruhe, and Nuremberg, and concludes with a history of the development of similar technical institutions in Prussia. These building and engineering trades' schools play an important part in German technical education, being intended, not to train captains of industry, but rather subaltern officers and the rank and file of the industrial army. The schools are in some cases State schools, in others municipal schools. In Prussia nineteen out of twenty-two existing are State schools. The instruction is given both in winter and summer in some schools, in others during the winter months only. It varies to a certain extent at the various schools, both as regards duration and extent. For example, Prussian schools possess four classes of half a year each for building, whilst Nuremberg possesses five, and Stuttgart and Karlsruhe six classes for the same purpose. As illustrative of the aims of these schools, reference may be made to that at Stuttgart, where in the building departments instruction suitable for the following workers is given:—practical master builders, subordinate building officials, road and street inspectors, fire prevention inspectors, railway inspectors, and hydraulic engineering *techniker*; in the mechanical engineering department to managers of workshops and factories, overseers, machine draughtsmen, &c.; and in the surveying department to public surveyors and drainage and irrigation supervisors.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 19.—"On the Rapidity of the Nervous Impulse in Tall and Short Individuals." By Dr. N. H. **Alcock**. Communicated by A. D. Waller, M.D., F.R.S.

While the effect of varying conditions on the rapidity of transmission of the nervous impulse has been fully studied, no research has yet been made as to whether the stature of the individual and the corresponding difference in the lengths of homologous nerves have or have not any influence on this rapidity, and as recent work has rendered it desirable that the question should be considered, the research here recorded was undertaken to this end.

Two series of observations were made:—(1) On the frog; (2) on man.

The results lead to the following conclusions:—

(1) The rapidity of the nervous impulse *per unit length* is the same whatever be the stature of the individual.

(2) The time taken by this impulse to travel from the centre to the periphery is greater in taller individuals.

(3) The nodes of Ranvier exercise no influence on the rate of impulse.

Physical Society, November 27.—Dr. R. T. Glazebrook, F.R.S., president, in the chair.—Mr. Horace **Darwin** exhibited an electric thermostat. The thermostat shown at the meeting was made for Lord Berkeley, and is similar to one made for the spectrograph of the 24-inch refractor of the Royal Observatory, Cape of Good Hope. The vessel the temperature of which is to be maintained constant is surrounded by oil contained in a bath. In the oil are placed two heating-coils, through which electric currents pass. By automatically controlling these currents the temperature of the oil, and consequently of the inner vessel, is kept very nearly constant. The control is effected by means of a Wheatstone-bridge in the outer oil-bath. This bridge has two opposite arms of copper and two of manganin, so that it is only balanced at some definite temperature. Its deviations from balance affect the position of a long horizontal boom attached to the suspended coil of a galvanometer. The position of the boom determines the greater or less descent of a "hit or miss" arm which is periodically raised by a rotating-cam, and can only fall to its lowest position when the galvanometer-boom is to one side and allows it to pass; this position of the boom corresponds to a fall of temperature of the controlling-bridge. Thus the position of the "hit or miss" arm at its lowest position depends on the temperature, and it is the variation of this position which regulates the amount of current passing through the heating-coils. The thermostat supplied to the Cape Observatory is capable of keeping the temperature within 1/100° C. for a period of eight hours.—On the occurrence of cavitation in lubrication, by Mr. S. **Skinner**. The experiments described in the paper arose from an observation made when determining the refractive index of a liquid by means of Newton's rings. As Newton showed, the rings can be obtained when a liquid is run into the space between the lenses. If when the liquid has been introduced the upper lens be rolled on the lower, the observer sees following the central dark spot a crescent-shaped space, very bright provided the illumination be sufficiently oblique. This is a vacuous or vapour-filled space, for when the motion of rolling ceases the liquid flows into the space and completely fills it. The inflow of the liquid depends in some way on the viscosity, and the effects are more pronounced when a more viscous liquid is used. The most convenient mode of observation is to use a deeply-coloured liquid, and to look at the space by transmitted light. The author has found that a convenient liquid is a strong solution of fuchsin in glycerin. The cavities which are formed must be produced either by splitting the liquid itself or by tearing the liquid from the glass surface. The effect may be described as a case of "cavitation." Some experiments were made to imitate the actual case of a fully lubricated axle rotating under a bearing. In ball-bearings completely immersed in oil, the experiments show that there must be a small cavity near the point of nearest approach of each ball to its neighbours, and also to the surface on which it is running. As the friction of the bearing is the viscous friction of the oil, it follows that the friction must be considerably reduced by the formation of these cavities, which are filled with relatively non viscous vapour. The high lubricating property of oils owes its origin not only to their superior viscosity, but also, possibly, to the facility with which cavities may be formed in them.—Prof. R. **Threlfall** exhibited and described the following instruments which he has used in the testing of electric generators by air calorimetry:—(1) A "hot-wire voltmeter" accurate to 1/100 volt. The wire in this instrument is very fine, and special precautions are taken to keep the tension on it constant, so that the elongation measured is due only to the expansion of the wire caused by the heating effect of the current. (2) A "Pitot tube" for the measurement of air velocity, the velocity being proportional to the square root of the pressure produced in the tube. (3) A "manometer" for determining pressure differences in Pitot tubes with accuracy. This consists essentially of two bottles containing coloured water, which are connected by a syphon, and the air-space of each bottle is put in communication with its appropriate tube. The readings are taken by setting a pair of needle-points just to touch the liquid surface, and then measuring how they differ in level by micrometer screws, or by callipering suitable jaws. The instrument is trustworthy to 0·01 mm. of water-pressure. (4) A multiplying pressure-gauge in which the motion of a float or ball is used to operate a finger moving round a dial. The dial is divided in such a manner that the square roots of the pressure-differences are read off. Air velocities are therefore given directly.

Geological Society, November 4.—Sir Archibald Geikie, F.R.S., vice-president, in the chair.—Metamorphism in the Loch-Lomond district, by Mr. E. Hubert **Cunningham-Craig**. The area dealt with includes all the Highland rocks on either side of the loch, as well as the area lying to the eastward. Each stage of the progressive metamorphism can be studied without confusing its effects with those of another process. The rocks from the Leny-Grit group and the Aberfoil-Slate group show dynamic metamorphism, and at Rudha Mor the beginning of the thermal type is seen. This is superseded by a constructive metamorphism, probably of hydrothermal type, and the rocks become more highly crystalline, until all clastic structures are obliterated. The segregation of like minerals into folia, the total recrystallisation, and the genesis of new mineral-groupings, result in the production of coarsely-crystalline albite-gneisses from siliceous and felspathic grits.—On a new cave on the eastern side of Gibraltar, by Mr. H. D. **Acland.** This cave is situated south of the eastern end of the tunnel, which pierces the Rock from the dockyard on the western side to "Monkeys' Quarry" on the eastern. The main hall is about 70 feet high and 45 feet wide, and has a smooth stalagmite floor resting on breccia, and a stalactitic roof covering the limestone of the Rock. Its floor falls to a point 19 feet above sea-level. The lower gallery descends at its far end to little short of sea-level. Its floor consists of stalagmite resting on calcareous sand; this on coarse sand, followed by rubbly and calcareous grit, which in time rests on the rock-floor at a depth of 15 feet. In the calcareous grit are well-rounded stones, some pierced by pholades. At a depth of 13 feet were echinids and barnacles. Two other galleries were explored, and in these the walls are pitted to a height of 28 feet above sea-level. The author concludes that the cave existed at first as a fissure, to which the sea obtained access for a long period, and during this period the rock was elevated some 42 feet. The cave was closed to the sea at a period geologically recent, and the breccia and sand-slopes date from a still more recent period.

Linnean Society, November 5.—Prof. S. H. Vines, F.R.S., president, in the chair.—Dr. W. G. **Ridewood** exhibited the frontal bones of a horse showing rudimentary horns. The bony protuberances were about three inches apart, and were set upon the curved ridges that constituted the anterior margins of the areas of origin of the temporal muscles. In the natural sloping position of the head in the living horse they would have been vertically above the orbits. Dr. Ridewood pointed out that the exceptional cases of horny bosses occurring in horses could hardly be regarded as instances of reversion, for the palæontological record of the evolution of the horse is remarkably complete, and no indications of horns are to be found in the extinct congeners of the modern equines.—Prof. **Weiss** exhibited some preparations and photographs of a mycorhiza or mycorhizome from the Coal-measures. The preparations were in part from the Cash collection at the Owens College, Manchester, and in part from Dr. Scott's private collection. They showed the existence in a small root-like organ of fungal filaments presenting all the appearances of those found in the roots of many orchids and in the rhizome of Psilotum.—Mr. B. H. **Bentley** exhibited a large series of lantern-slides, designed for teaching purposes, which he had taken, illustrating certain types of floral pollination, and bees and other insects in actual operation.—Mr. L. A. **Boodle** read a paper on the structure of leaves of the bracken, *Pteris aquilina*, in relation to environment. It is well known that in dry exposed situations the bracken produces leaves of a hard dwarf habit, while in very sheltered localities the leaves are quite soft. This difference in external characters is accompanied by a difference in structural characters. The exposed leaf has a hypoderm, and is a distinctly xerophytic "sun-leaf"; the other type of leaf is a pronounced "shade-leaf," having no hypoderm, and weakly developed palisade-tissue or no definite palisade. A similar difference may occur in different leaves of the same plant, or in different parts of the same leaf when shelter and exposure are sufficiently localised. A slightly xerophytic plant, when transferred to a greenhouse, produced shade-leaves only (though the illumination was fairly strong), and in these leaves the indusia were considerably reduced. The bracken is thus very plastic in its relation to environment.—A paper by Mr. E. P. **Stebbing**, on the life-history of a new Monophlebus from India, with a note on that of a Vedalia predaceous upon it; with remarks on the Monophlebinæ of the Indian region, was, in the absence of the author, read for him by Mr. G. S. Saunders. Up to 1901 only five species of the genus Monophlebus were known as Indian, and four of these were described from the male insect only; in that year the writer discovered both sexes of two new species, which had been named by Mr. E. Ernest Green, Government entomologist, Ceylon, *Monophlebus Stebbingi* and *M. Dalbergae*, whilst a third species, of which the females alone are known, was named *M. Tectonae*. These coccids infest forests in large numbers, and in consequence their ravages are serious. The amount of nutriment withdrawn from the trees is extraordinary, and the extruded sugary fluid may be heard falling like rain in an infested forest. The predaceous *Vedalia Guerinii*, Crotch, was then described, and its method of attack and great voracity; in turn, it is parasitised by a small fly whilst in the larval stage.

PARIS.

Academy of Sciences, November 25.—M. Albert Gaudry in the chair.—The relation between sun-spots and terrestrial magnetism. The utility of continual registration of the variable elements of the sun, by M. H. **Deslandres.** After a critical examination of the various hypotheses which have been put forward to connect solar phenomena with magnetic storms, the conclusion is arrived at that the solution of the problem has not yet been reached.—On the geological significance of anomalies in gravity, by M. **de Lapparent.** It is generally accepted that gravity is in excess of the average in oceanic regions, and is below the average on land. The suggestion is made, in opposition to the views of M. Faye, that the observed anomalies are due rather to the effect of dislocation than of the low temperature of the ocean floor.—On the reinforcement of the action of the bundle of light rays upon the eye, when accompanied by the *n*-rays, by M. R. **Blondlot.** It has been shown in previous papers that a feebly illuminated object increases in brightness when the *n*-rays are allowed to fall on it. It has now been found that if the *n*-rays are directed towards the eye instead of the object, a similar reinforcement is observed.—M. Émile Bertin was elected a member in the section of geography and navigation in the place of the late M. de Bussy.—On functional equations and the theory of divergent series, by M L. **Fejer.**—On a system of three functions of real variables, by M. **Pompieu.**—On the possibility of sustaining in the air an apparatus employing a helix, using an internal combustion motor, by M. Charles **Renard.** The reduction in the weight of an internal combustion motor per horse-power developed, now brought as low as 2·5 kilograms per horse-power, renders possible the use of a light helix in an aërostat. The theory is given for the conditions necessary in practice.—On the measurement of the effect of electric waves at a distance by means of the bolometer, by M. G. **Tissot.** The use of a bolometer as a detector has given readable results at a distance of 40 kilometres. The most advantageous arrangement of the apparatus has been worked out experimentally.—On the colour of aqueous solutions of methyl orange and the change produced by acids, by M. P. **Vaillant.** Simultaneous observations of electrical conductivity and molecular absorption (measured with the Gouy spectrophotometer) show that neither the theories of Ostwald nor of Küster are completely in accord with fact. The results point to a progressive molecular transformation of methyl orange under the action of acids, the change being more rapid with the stronger acids.—The modes of deformation and fracture of iron and mild steel, by MM. F. **Osmond,** Ch. **Frémont,** and G.

Cartaud.—Influence of the gases on the separation of metals by electrolysis: the separation of nickel and zinc, by MM. **Hollard** and **Bertiaux.** The introduction of a sulphite, preventing the evolution of oxygen at the anode, permits of the easy separation of nickel from zinc by electrolysis. Experimental analyses are given.—On oxalacetic acid, by M. L. J. **Simon.** The ether is treated with concentrated hydrochloric acid; the free acid, which is insoluble in this liquid, separates completely in about forty-eight hours.—The condensation of the salts of dinaphthopyryl with phenols, by M. R. **Fosse.**—The synthesis of nicotine, by M. Amé **Pictet.** Starting with nicotinic acid, this is converted into β-aminopyridine, the dry distillation of the mucate of this base giving a N-pyridyl-pyrrol. The vapours of this substance, passed through a red-hot tube, give α-pyridyl-pyrrol, which, is methylated, giving the isodipyridine of Cahours and Étard (the nicotyrine of Blau). This gives inactive nicotine on suitable reduction, and from this an alkaloid identical in all respects with natural nicotine was obtained in the usual way with dextrorotatory tartaric acid.—The morphogenic action of water in motion on hydra, by Mme. S. **Motz-Kossowska.**—On the function of certain figured elements in *Sipunculus nudus*, by M. F. **Ladreyt.**—On the medusa of Victoria Nyanza, by M. Ch. **Gravier.**—On a double fusion of the membranes in the zygospore of Sporodinia, by M. Paul **Vuillemin.**—On a bacterial disease of the beetroot causing yellowing, by M. G. **Delacroix.** This disease attacks both the forage and sugar beet; practical suggestions are given with a view to its prevention.—On the formations of the zone of quartzites and conglomerates below the Devonian in the Northern Urals, by MM. L. **Duparc** and F. **Pearce.**—On the structure of the Hohe Tauern, in the Tyrolese Alps, by M. Pierre **Termier.**—Contribution to the study of the sodic rocks of East Africa, by M. H. **Arsandaux.**—The volcanic rocks of the island of Eubea, by M. **Deprat.**—The morphogenic action of crotaphytic muscles on the skull and brain of the Carnivora and Primates, by M. R. **Anthony.**—Comparison between the nervous effects of the Becquerel rays and those of light rays, by M. Georges **Bohn.** The action of radium rays upon the teguments is very complicated, acting upon the peripheral nervous filaments, producing a kind of anæsthesia.—On the existence in the animal organism of a diastase possessing simultaneously both oxidising and reducing actions, by MM. J. E. **Abelous** and J. **Aloy.**—On the marsh gas fermentation and the ferment which produces it, by M. **Mazé.** From a fermenting mass of dead leaves a specific organism has been isolated capable of producing methane during the fermentation of suitable solutions.—On tuberculins, by M. **Beraneck.**—A Crookes bulb for radiotherapy, by M. **Audin.** A description of an X-ray tube specially adapted for the treatment of cancer of the mouth and throat.

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 3.

ROYAL SOCIETY, at 4.30.—On the Fructification of *Neuropteris heterophylla*, Brongniart: R. Kidston, F.R.S.—Histological Studies on Cerebral Localisation: Dr. A. W. Campbell.

LINNEAN SOCIETY, at 8.—On Littoral Polychæta from the Cape of Good Hope: Dr. Arthur Willey, F.R.S.—Notes on *Myriactis Areschougii* and *Coilodesme californica*: Miss May Rathbone.

RÖNTGEN SOCIETY, at 8.30.—The Production of Photographic Reversal under the Combined Action of various Radiations: C. E. S. Phillips.

AËRONAUTICAL SOCIETY, at 8.—Report of the International Kite Competition—(1) Mathematical Portion: Prof. C. V. Boys, F.R.S.; (2) Descriptive Portion: Eric Stuart Bruce.—Preliminary Communication on the Longitudinal Stability of Aëroplane Machines: Prof. G. H. Bryan, F.R.S., and W. E. Williams.—The Balloon Ascents made by the late Mr. James Glaisher, F.R.S., for Scientific Purposes: W. Marriott.—The Mechanical Imitation of Bird Flight: W. Cochrane.

CHEMICAL SOCIETY, at 8.—On the Molecular Formulæ of some Fused Salts as Determined by their Molecular Surface Energy: J. F. Bottomley.—Acid Salts of Monobasic Acids: R. C. Farmer.—The Atmospheric Corrosion of Zinc: G. T. Moody.—The Solubilities of the Hydrates of Nickel Sulphate: B. D. Steele and F. M. G. Johnson.

FRIDAY, DECEMBER 4.

GEOLOGISTS' ASSOCIATION, at 8.—On Land, Freshwater and Estuarine Deposits, with Special Reference to Recent Excursions; Lecture by the President, Mr. H. W. Monckton.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Artificial Draught, as Applied by Fans to Steam Boilers: W. H. A. Robertson.

MONDAY, DECEMBER 7.

SOCIETY OF ARTS, at 8.—The Mining of Non-Metallic Minerals Bennett H. Brough. (Cantor Lectures. III.)

FARADAY SOCIETY, at 8.—Total and Free Energy of the Lead Accumulator: Dr. R A Lehfeldt.—Bitumen in Insulating Compositions, Part i.: D. A. Sutherland.—Notes on Aluminium Welding: Sherard Cowper Coles.—Electrochemical Installation at the Borough Polytechnic Institute: Dr. F. M. Perkin.

TUESDAY, DECEMBER 8.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Discussion of Paper on the Distribution of Mean and Extreme Annual Rainfall over the British Isles: Dr. H. R. Mill.

WEDNESDAY, DECEMBER 9.

SOCIETY OF ARTS, at 8.—Furnaces suitable for Jewellers' Work, Enamelling, Art Casting, and other Similar Industries: Henry H. Cunynghame.

THURSDAY, DECEMBER 10.

MATHEMATICAL SOCIETY, at 5.30.—Proof of a Formula in Elliptic Functions: Mr. R. J. Dallas.—On Many-valued Newtonian Potentials: Prof. A. C. Dixon.—A Generalisation of Neumann's Expansion of an Arbitrary Function in a Series of Bessel's Functions: Rev. F. H. Jackson.—Modes of Convergence of Infinite Series of Functions of a Real Variable: Dr. E. W. Hobson.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Presentation to representatives of the Borough of Colchester of a historical picture representing Dr. Gilbert in the act of showing his electrical experiments to Queen Elizabeth and her Court.—The Slow Registration of Rapid Phenomena by Strobographic Methods: the "Ondographe" and "Puissancegraphe" (Wave Recorder and Power Recorder): M. E. Hospitalier.—The Magnetic Dispersion in Induction Motors, and its Influence on the Design of these Machines: Dr. Hans Behn-Eschenburg.

SOCIETY OF ARTS, at 4.30.—India's Place in an Imperial Federation: J. M. Maclean.

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